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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,089	09/10/2003	Lee Jen Chen	MXIC-P910270	6595
7590 04/03/2006 Stout, Uxa, Buyan & Mullins, LLP 4 Venture, Suite 300 Irvine, CA 92618			EXAMINER HOANG, QUOC DINH	
			ART UNIT 2818	PAPER NUMBER

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/661,089

Applicant(s)

CHEN ET AL.

Examiner

Quoc D. Hoang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-11,13-17 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-11,13-17 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Amendment filed 01/03/2006 has been entered. In the Amendment, claims 2, 12 and 18-24 have been canceled. Claim 25 is newly added. Claims 1, 3-11, 13-17 and 25 are pending in the application.

Applicants' remarks have been considered.

Specification

2. The amendment filed on 01/03/2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "leaving the oxide cap over the phosphosilicate glass layer for a period of time of at least about **three days**" in claim 1 and "the cap oxide layer protecting the glass layer from defect formation by shielding the glass layer from moisture **which is present in an immediate vicinity of the cap oxide layer** and which would result in the formation of defects if allowed to contact the glass layer" in claim 7.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3-11, 13-17 and 25, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankel (U.S. Pat No. 5,968,587).

Regarding claim 1, Frankel teaches a method comprising forming an oxide cap 1030 upon a phosphosilicate glass layer 1008 via a chemical vapor deposition process and leaving the oxide cap over the phosphosilicate glass layer (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D).

Frankel teaches leaving the oxide cap over the phosphosilicate glass layer, but fails to teach leaving the oxide cap over the phosphosilicate glass layer for a period of time of at least about three days. It would be have been obvious to a person of ordinary skill in the art at the time of the invention was made to keep the oxide cap over the phosphosilicate glass layer, not only in three days, but may be for a period of time of longer than that in order to control diffusion of dopant atoms in the doped dielectric layer downward into the semiconductor material and improve stability and immunity to moisture absorption as taught by Frankel, column 52, lines 50-55.

The limitation that the method is "for mitigating defect formation" has not been given patentable weight because it has been held that a preamble in denied the effect of a limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claim 3, Frankel teaches a method comprising:

forming a phosphosilicate glass layer 1008 upon a substrate 1004 (col. 40, lines 51 through col. 43 line 10 and Fig. 19A); and

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forming an oxide cap 1030 upon the phosphosilicate glass layer 1008, the oxide cap 1030 having a phosphorus blocking capability of 2-8% by weight (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D).

Frankel teaches wherein a phosphorus blocking capability of the cap oxide layer is between about 2-8 wt% phosphorus, but fails to teach wherein a phosphorus blocking capability of the cap oxide layer is at least 11% by weight (col. 66, lines 49-51). However, although Frankel's wt % of phosphorus (2-8 wt% phosphorus) is not in the claimed range (11wt% phosphorus), this does not define patentable over Frankel since the concentration of phosphorus in the phosphosilicate glass layer is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

The limitation that the method is "for mitigating defect formation" has not been given patentable weight because it has been held that a preamble in denied the effect of a limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claim 4, Frankel teaches a method comprising:

forming a glass layer 1008 upon a silicon substrate 1004 (col. 40, lines 51 through col. 43 line 10 and Fig. 19A); and

forming an oxide cap 1030 upon the glass layer 1008, the oxide cap 1030 being formed to a thickness of at least about 50-500 Angstroms (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D).

Frankel teaches wherein the cap oxide layer 1030 is formed to have a thickness between about 50-500 Angstroms, but fails to teach wherein the cap oxide layer 1030 having a thickness greater than 300 Angstroms (col. 52, line 5). However, although Frankel's cap oxide layer thickness (50-500 Angstroms) is not in the claimed range (greater than 300 Angstroms), this does not define patentable over Frankel since the thickness is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

The limitation that the method is "for mitigating defect formation" has not been given patentable weight because it has been held that a preamble in denied the effect of a limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claim 5, Frankel teaches a method comprising:

forming a glass layer 1008 upon a substrate 1004 having at least one semiconductor layer formed thereon (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D); and

forming a cap oxide 1030 upon the glass layer 1008 (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D).

Frankel teaches the oxide cap over the phosphosilicate glass layer, but fails to teach leaving the oxide cap over the phosphosilicate glass layer for a period of time of at least about a day (Fig. 19D). It would be have been obvious to a person of ordinary skill in the art at the time of the invention was made to keep the oxide cap over the

phosphosilicate glass layer, not only in a day, but may be for a period of time of longer than that in order to control diffusion of dopant atoms in the doped dielectric layer downward into the semiconductor material and improve stability and immunity to moisture absorption as taught by Frankel, column 52, lines 50-55.

The limitation that the method is "for mitigating defect formation" has not been given patentable weight because it has been held that a preamble in denied the effect of a limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claim 6, Frankel teaches forming an oxide cap layer 1030 upon the phosphosilicate glass layer 1008 comprising forming the cap oxide layer 1030 via a chemical vapor deposition process (col. 52, lines 20).

Regarding claim 7, Frankel teaches a method comprising:

forming a glass layer 1008 upon a substrate 1004 via a first chemical vapor deposition process (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D); and

forming a cap oxide 1030 upon the glass layer 1008 via a second chemical vapor deposition process, the cap oxide layer protecting the glass layer from defect formation by shielding the glass layer from moisture which is present in an immediate vicinity of the cap oxide layer and which would result in the formation of defects if allowed to contact the glass layer (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D). *Note that, without the USG capping layer, the dopant atoms diffuse*

upward away from the semiconductor material during rapid thermal process is considered "the formation of defects" (see col. 51 lines 15-18).

The limitation the method is "for mitigating defect formation" has not been given patentable weight because it has been held that a preamble in denied the effect of a limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claim 8, Frankel teaches wherein forming the cap oxide layer 1030 comprises forming an undoped oxide layer (USG or undoped silicate glass) 1030 upon the glass layer 1008 (col. 42, line 38).

Regarding claim 9, Frankel teaches a method comprising:

forming a glass layer 1008 upon a substrate 1004 (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D); and

forming a cap oxide 1030 upon the glass layer 1008, the forming of a cap oxide layer comprising forming an undoped oxide layer (USG) 1030 upon a P-doped oxide film (PSG) 1008, the oxide cap protecting the underlying glass layer from defect formation (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D). *Note that the dopant atoms diffuse upward away from the semiconductor material during rapid thermal process is considered "the formation of defects" (see col. 51 lines 15-18).*

Frankel teaches the oxide cap over the phosphosilicate glass layer, but fails to teach the oxide cap over the phosphosilicate glass layer for a period of time of at least

about a day (Fig. 19D). It would be have been obvious to a person of ordinary skill in the art at the time of the invention was made to keep the oxide cap over the phosphosilicate glass layer, not only in a day, but may be for a period of time of longer than that in order to control diffusion of dopant atoms in the doped dielectric layer downward into the semiconductor material and improve stability and immunity to moisture absorption as taught by Frankel, column 52, lines 50-55.

The limitation that "for mitigating defect formation in a glass layer of a semiconductor device" has not been given patentable weight because it has been held that a preamble in denied the effect of a limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claim 10, Frankel teaches a method comprising:

forming a glass layer 1008 upon a substrate 1004 (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D); and

forming a cap oxide 1030 upon the glass layer 1008, and

leaving the cap oxide layer 1030 upon the glass layer 1008 (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D).

Frankel teaches leaving the oxide cap over the phosphosilicate glass layer, but fails to teach leaving the oxide cap over the phosphosilicate glass layer for a period of time of a day. (Fig. 19D). It would be have been obvious to a person of ordinary skill in the art at the time of the invention was made to keep the oxide cap over the

phosphosilicate glass layer, not only in a day, but may be for a period of time of longer than that in order to control diffusion of dopant atoms in the doped dielectric layer downward into the semiconductor material and improve stability and immunity to moisture absorption as taught by Frankel, column 52, lines 50-55.

The limitation that the method is for mitigating defect formation has not been given patentable weight because it has been held that a preamble in denied the effect of a limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa v. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claim 11, Frankel teaches wherein the cap oxide layer 1030 is formed to have a thickness between about 50-500 Angstroms, but fails to teach wherein the cap oxide layer 1030 having a thickness greater than 300 Angstroms (col. 52, line 5). However, although Frankel's cap oxide layer thickness (50-500 Angstroms) is not in the claimed range (greater than 300 Angstroms), this does not define patentable over Frankel since the thickness is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

Regarding claim 13, Frankel teaches wherein the cap oxide layer (USG) 1030 is formed by SiH_4 and N_2O reacting gases (col. 50, lines 45-46).

Regarding claim 14, Frankel teaches wherein the cap oxide layer (USG) 1030 is formed by TEOS and O_2 reacting gases (col. 51, lines 40-45).

Regarding claim 15, Frankel teaches wherein the cap oxide layer 1030 process temperature is between approximately 350°C and approximately 600°C (col. 51, line 32).

Regarding claim 16, Frankel teaches wherein the glass layer 1008 process temperature is between approximately 450°C and approximately 650°C (col. 50, line 34).

Regarding claim 17, Frankel teaches wherein forming the cap oxide layer 1030 comprises forming inter-metal dielectric layers (IMD) (col. 50, lines 22-23).

Regarding claim 25, Frankel teaches wherein a reactor 15 within which the first and second chemical vapor deposition processes are performed is not broken between the first and second chemical vapor deposition processes (col. 40, lines 51 through col. 51 line 25, col. 61, lines 12-23, and Figs. 19A-19D).

Response to Arguments

5. Applicant's arguments filed 01/03/2006 have been fully considered but they are not persuasive.

The Applicant's argument that Frankel does not appear to disclose or suggest the cap oxide layer being formed to a thickness of at least about 300 Angstroms, and a cap oxide layer having a phosphorus blocking capability of at least 11 % by weight.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was

within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

6. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quoc Hoang whose telephone number is (571) 272-1780. The examiner can normally be reached on Monday-Friday from 8.00 AM to 5.00 PM.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone numbers of

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the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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